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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/015,863	12/12/2001	Willibrord A. Groten	CDT 1756-2	2592
7590 12/17/2003 KENNETH H. JOHNSON P.O. BOX 630708 HOUSTON, TX 77263			EXAMINER ARNOLD JR, JAMES	
			ART UNIT 1764	PAPER NUMBER
DATE MAILED: 12/17/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/015,863

Applicant(s)

GROTEN, WILLIBRORD A.

Examiner

James Arnold, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatanaka et al. (EP 0 725 126) in view of Audeh et al. (USPN 4,265,735) and Putman (USPN 6,231,752).

The Hatanaka reference discloses a process for desulfurizing catalytically cracked gasoline comprising separating the catalytically cracked gasoline into at least one of a fraction that has a high content of a single or a plurality of sulfur compounds that are difficult to desulfurize and a fraction that has a high content of a single or a plurality of sulfur compounds that are easy to desulfurize, subjecting at least one of the fractions to hydrodesulfurization under optimum conditions, and mixing the fractions. See Page 3, lines 4-8. The reference discloses the boiling point of the light fraction from about 30 to about 180 C (86 F to 356 F) and the boiling

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point of the heavy fraction being from about 80 to 250 C (176 F to 482 F). See Page 3, lines 18-19.

The reference does not disclose a desulfurization process comprising the steps of separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction, an intermediate cracked naphtha fraction, and a heavy cracked naphtha; subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurization catalyst; and combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor. The reference does not disclose a process wherein light cracked naphtha contains substantially all of the mercaptans and is subjected to a wet caustic wash process wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed. The reference does not disclose a process wherein the intermediate cracked naphtha contains mercaptans and substantially all of the thiophenes and substantially all of said mercaptans and thiophenes are converted to hydrogen sulfide in a second hydrodesulfurization reactor. The reference does not disclose a process wherein said heavy cracked naphtha contains thiophenes and substantially all of said other organic sulfur compounds and a portion of said thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said first hydrodesulfurization reactor. The reference does not disclose a process wherein substantially all of the remaining thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said second hydrodesulfurization reactor. The reference does not disclose a process wherein the full boiling range cracked naphtha stream is first subjected to thioetherification in a thioetherification reactor

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prior to separating the full boiling range cracked naphtha stream into said three fractions, wherein substantially all of said mercaptans are reacted with a portion of said diolefins to form sulfides. The reference does not disclose a process wherein said sulfides are removed in said heavy cracked naphtha and substantially all of said sulfides are converted to hydrogen sulfide in said first hydrodesulfurization reactor. The reference does not disclose a process wherein the remaining sulfides are converted to hydrogen sulfide in said second hydrodesulfurization reactor. The reference does not disclose a process wherein the intermediate cracked naphtha fraction boils in the range of about 150 to 250 F.

The Audeh reference discloses a wet caustic wash of a hydrocarbon stream wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed. See Column 12, lines 17-40. The Putman reference discloses the thioetherification of a full boiling range cracked naphtha stream. See Column 2, lines 39-45 and Column 5, lines 45-46.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Hatanaka to include a wet caustic wash of a hydrocarbon stream wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed because both the Audeh and Hatanaka references disclose removal of impurities from hydrocarbon streams. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Hatanaka to include the thioetherification of a full boiling range cracked naphtha stream because both the Hatanaka reference and the Putman reference disclose removal of impurities from hydrocarbon streams and thioetherification allows for conversion of mercaptans to sulfides. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a

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desulfurization process comprising the steps of separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction, an intermediate cracked naphtha fraction, and a heavy cracked naphtha; subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurization catalyst; and combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor because the Hatanaka reference discloses separating gasoline into a plurality of fractions and mixing the fractions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the full boiling range cracked naphtha stream is first subjected to thioetherification in a thioetherification reactor prior to separating the full boiling range cracked naphtha stream into said three fractions, wherein substantially all of said mercaptans are reacted with a portion of said diolefins to form sulfides; wherein said sulfides are removed in said heavy cracked naphtha and substantially all of said sulfides are converted to hydrogen sulfide in said first hydrodesulfurization reactor; wherein the remaining sulfides are converted to hydrogen sulfide in said second hydrodesulfurization reactor; and wherein the intermediate cracked naphtha fraction boils in the range of about 150 to 250 F because the reference discloses separating gasoline into a plurality of fractions and mixing the fractions; the reference discloses diverse constituent components for gasoline and varied boiling points; and because sulfides removed through thioetherification are higher boiling and can be removed with a heavier naphtha fraction. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the intermediate cracked naphtha contains mercaptans and

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substantially all of the thiophenes and substantially all of said mercaptans and thiophenes are converted to hydrogen sulfide in a second hydrodesulfurization reactor; wherein said heavy cracked naphtha contains thiophenes and substantially all of said other organic sulfur compounds and a portion of said thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said first hydrodesulfurization reactor; and wherein substantially all of the remaining thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said second hydrodesulfurization reactor because the reference discloses diverse constituent components of gasoline and hydrodesulfurization of gasoline.

### ***Response to Arguments***

Applicant's arguments have been fully considered but are not deemed persuasive. Applicant states that the Hatanaka (EP0725126) process is the antithesis of applicant's claimed process. This is untrue. Hatanaka discloses dividing gasoline into **at least one** fraction and subjecting **at least one** of the fractions to treatment. See page 3, lines 5-9. Furthermore, applicant argues that obviousness is not possible because all of the claimed limitations are not present in the references. However, in each case where a limitation was not found in the references, appropriate motivation and rationale were given for each obviousness determination. Therefore, the Examiner maintains that applicant's invention would have been obvious to one having ordinary skill in the art at the time the invention was made.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Arnold, Jr. whose telephone number is 703-305-5308. The examiner can normally be reached on Monday-Thursday 8:30 AM-6:00 PM; Fridays from 8:30 AM-5:00 PM with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.

ja  
December 8, 2003

  
**Walter D. Griffin**  
**Primary Examiner**